

CENTRAL INTELLIGENCE AGENCY

## INFORMATION REPORT

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COUNTRY **East Germany**

REPORT

SUBJECT **East German Development of  
Geiger-Mueller Counters**

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THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.  
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1. In January 1955, the Department of Biophysics in the Academy Institute for Medicine and Biology in Berlin-Buch completed the development of a Geiger-Mueller counter for the measurement of radioactive radiation. The development was carried out under the supervision of Sieland (fnu). Laboratory models of the counter were completed in January 1955.
2. The counters will be produced in rather large (not specified) quantities by VEB Carl Zeiss, Jena. Production will be carried out according to specifications provided by the Biophysical Department of the Institute. These specifications, called "Construction Prescriptions", were forwarded to the Jena firm [redacted]. These contain all essential data on the materials to be used, including their dimensions, and on the steps in fabrication.

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Construction Prescriptions for the Geiger-Mueller CounterA. General

All work steps and the filling of the counters must be carried out extremely carefully and with the observation of the most rigid sanitary measures. Impurities on the surfaces of the cathode and anode material as well as impurities of the glass material have a strong detrimental effect upon the operation of the counter. The same goes for impurities of the filling gases.

B. Fabrication of the Cathode Tube

Material: brass, round.  
Diameter: 10 millimeter, plus or minus 0.5  
Length: 70 mm. plus or minus 1  
Wall Strength: 0.1 mm. plus or minus 0.02

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Work steps1) Interior surface:

- a. boring
- b. rubbing for purification
- c. grinding (laeppen)

2) Exterior surface:

- a. the tube is fastened with the aid of shellac or paraffin upon a cylindrical "thorn" in order not to damage the interior surface during the processing.
- b. The tube is turned so as to have the wall strength indicated above. The play (Schlag) occurring during the turning is not to exceed 0.015 mm.
- c. Polishing.

3) Purifying of the Tube:

The purifying of the tubes is carried out through storing them during 24 hours in 96% alcohol (Aethanol). They are rubbed dry with cotton.

4) Preservation of the Tubes:

The tubes are preserved in a closed glass container until they needed for construction. They will be taken out of the container only when they are needed for the construction of the device.

C. Anode Wire

Material: Very pure drawn platinum wire with extremely smooth surface. The wire should not have any deformations.

Diameter: 0.1 mm.

Length: dependent upon the melting procedure.

Electrode feed wire: Pink wire 0.25 to 0.5 mm. in diameter.

Preparations for assembly:

- a. A piece of platinum wire about 80 to 90 mm. in length is welded upon a Kunfermantel-Einschmelzdraht (called Pink wire) of 0.5 mm. diameter (spot-welding or butt-welding). This piece of Pink wire serves as the feed wire to the very sensitive anode wire.
- b. Annealing of the platinum wire either electrically or in the open flame. The electrical annealing process is preferable. Subsequently the platinum wire is rubbed with Aethanol.
- c. The work steps mentioned under a. and b. above are to be carried out only a short time before the wire is melted into the tube. After that the wire is no longer to be touched with the hands.

D. The Glass Body:

Material: Thermometer glass 16/III or Thuringian glass.

Diameter: 11 mm. (dependent upon the cathode wire).

E. The Melting-In procedure in Successive Steps:

- 1) Make a "point" (Spitze) with a diameter of 0.25 to 0.5 mm. at its narrowest place and melt this point into a glass tube whose diameter is about 0.5 mm. larger than that of the metal tube. Center the point correctly (see figure 1 of annex).

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\* Note: Literally copper sheath-sealed-in wire.

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- 2) Heat with Spitalight\* a certain point of the glass tube near the spot where the point is melted in to the tube and draw out the heated glass (diameter about 0.5 mm.) and cut off. The wire is melted into the tube after it is shaped in such a way that it just fits into the space between the glass and the metal surface (see figure 2 of annex).
- 3) Then melt a pump tube (Pumpstutzen) into the glass body at a point about opposite the spot where the glass was drawn out as described in 2) above. Cut off the pump tube so that it has a length of about 6 to 8 mm. (see figure 3 of annex).
- 4) Connect the platinum wire with the Pink wire through spot welding or butt-welding and anneal.
- 5) Fit the metal tube into the glass tube. Care must be taken that the wire is in a firm position between glass and metal. The metal tube must not be loose (see figure 4 of annex).
- 6) Narrow the end marked by a. in figure 5 of annex and draw a point.
- 7) Introduce the platinum wire through the point a. and weld it onto the narrow point. Care must be taken that the platinum wire is well centered (see figure 6 of annex).
- 8) Melt the wire once more upon the narrow point and adjust its centering through careful drawing (see figure 7 of annex).

#### F. Filling Prescriptions:

Filling gas: Doubly-distilled alcohol of 10mm. Hg plus spectrally pure argon of 80 mm. Hg.

Total Pressure: 90 mm. Hg.

Mixture relation: 1 to 8.

Evacuation to about  $1 \cdot 10^{-3}$  mm. Hg. The density is tested by separating the counter tube from the pump with the aid of the vacuum tap. The counter tube is left in this condition for several hours. If then the tap is reopened, the mercury level of the manometer must not change. Rinsing of the counter tube one or several times is recommended. After evacuation, the filling is carried out with doubly-distilled alcohol vapor of 10 mm. Hg and with spectrally pure argon so that a total pressure of 90 mm. Hg is obtained. The mixing time of the gases within the counter tube is about 20 hours. The mixing time can be considerably reduced through use of a mixing container with the vacuum pump where the gases are mixed in the required proportion before they are inserted into the tube as a mixture. Immediately after the mixing time is completed the voltage-impulse characteristics of the counter tube is recorded for information purposes.

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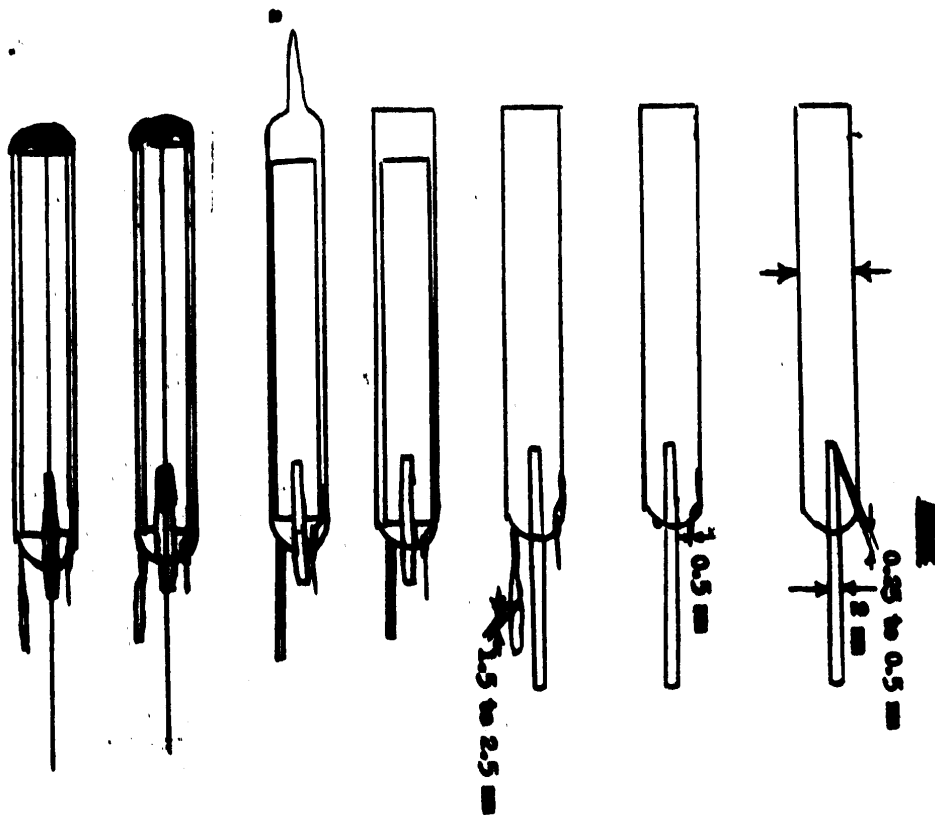
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\* Note: Literally pointed light.

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